# NAVAL POSTGRADUATE SCHOOL
## Monterey, California


# THESIS



AN INVESTIGATION OF DIFFERENCES IN MOTIVATORS OF INFORMATION SYSTEMS AND NON-INFORMATION SYSTEMS PERSONNEL AND IN THE MOTIVATING POTENTIAL OF JOBS IN THE INFORMATION SYSTEMS AND NON-INFORMATION SYSTEMS FIELDS

by

Janice M. Veneri

September 1988

Thesis Advisor: Taracad R. Sivasankaran

# REPORT DOCUMENTATION PAGE

| | |
|---|---|
| 1a. REPORT SECURITY CLASSIFICATION<br>UNCLASSIFIED | 1b RESTRICTIVE MARKINGS |
| 2a. SECURITY CLASSIFICATION AUTHORITY | 3. DISTRIBUTION/AVAILABILITY OF REPORT<br>Approved for public release; distribution is unlimited |
| 2b. DECLASSIFICATION/DOWNGRADING SCHEDULE | |
| 4. PERFORMING ORGANIZATION REPORT NUMBER(S) | 5 MONITORING ORGANIZATION REPORT NUMBER(S) |
| 6a. NAME OF PERFORMING ORGANIZATION<br>Naval Postgraduate School<br>6b OFFICE SYMBOL (*If applicable*)<br>Code 37 | 7a. NAME OF MONITORING ORGANIZATION<br>Naval Postgraduate School |
| 6c. ADDRESS (*City, State, and ZIP Code*)<br>Monterey, California 93943-5000 | 7b. ADDRESS (*City, State, and ZIP Code*)<br>Monterey, California 93943-5000 |
| 8a. NAME OF FUNDING/SPONSORING ORGANIZATION<br>8b OFFICE SYMBOL (*If applicable*) | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER |
| 8c. ADDRESS (*City, State, and ZIP Code*) | 10 SOURCE OF FUNDING NUMBERS<br>PROGRAM ELEMENT NO. / PROJECT NO. / TASK NO / WORK UNIT ACCESSION NO. |

11. TITLE (*Include Security Classification*)
AN INVESTIGATION OF DIFFERENCES IN MOTIVATORS OF INFORMATION SYSTEMS AND NON-INFORMATION SYSTEMS PERSONNEL AND IN THE MOTIVATING POTENTIAL OF JOBS IN THE INFORMATION SYSTEMS AND

12. PERSONAL AUTHOR(S)
Veneri, Janice M.

| 13a TYPE OF REPORT | 13b TIME COVERED | 14. DATE OF REPORT (*Year, Month, Day*) | 15 PAGE COUNT |
|---|---|---|---|
| Master's Thesis | FROM _____ TO _____ | 1988, September | 75 |

16 SUPPLEMENTARY NOTATION
The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

| 17 COSATI CODES | | |
|---|---|---|
| FIELD | GROUP | SUB-GROUP |
| | | |
| | | |

18 SUBJECT TERMS (*Continue on reverse if necessary and identify by block number*)
Motivational Differences; Personality Characteristics; Growth Need; Motivating Potential of Jobs; Project Teams; Managing MIS Personnel

19. ABSTRACT (*Continue on reverse if necessary and identify by block number*)

A survey was conducted to investigate motivational differences between IS and non-IS personnel. The motivational factors of growth need strength (GNS), group interaction strength (GIS), advanced technology strength (ATS), and change acceptance strength (CAS), were tested as well as differences in the motivating potential of jobs. Control for occupational level differences was achieved by classifying the respondents into one of three job categories: professional/technical, managerial, and clerical/operations. With the exception of higher ATS for the IS professionals, no significant differences were found. Additional analysis explored other factors, such as occupational level, age, sex, and educational level, that might account for some of the variation in the scores. The implications of the findings were discussed and recommendations made for further research.

| 20 DISTRIBUTION/AVAILABILITY OF ABSTRACT | 21 ABSTRACT SECURITY CLASSIFICATION |
|---|---|
| ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS | Unclassified |
| 22a NAME OF RESPONSIBLE INDIVIDUAL<br>Prof. Benjamin J. Roberts | 22b TELEPHONE (*Include Area Code*)<br>(408) 646-2792<br>22c OFFICE SYMBOL<br>Code 54Ro |

DD FORM 1473, 84 MAR 83 APR edition may be used until exhausted
All other editions are obsolete



☆ U.S. Government Printing Office 1986—606-24.

#11 - TITLE - (CONTINUED)

NON-INFORMATION SYSTEMS FIELDS

Approved for public release; distribution is unlimited

# An Investigation of Differences in Motivators of Information Systems and Non-Information Systems Personnel and in the Motivating Potential of Jobs in the Information Systems and Non-Information Systems Fields

by

Janice M. Veneri
Lieutenant, United States Navy
B.A., Indiana University of Pennsylvania, 1972

Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN INFORMATION SYSTEMS

from the

NAVAL POSTGRADUATE SCHOOL
September 1988

ABSTRACT

A survey was conducted to investigate motivational differences between IS and non-IS personnel. The motivational factors of growth need strength (GNS), group interaction strength (GIS), advanced technology strength (ATS), and change acceptance strength (CAS), were tested as well as differences in the motivating potential of jobs. Control for occupational level differences was achieved by classifying the respondents into one of three job categories: professional/technical, managerial, and clerical/operations. With the exception of higher ATS for the IS professionals, no significant differences were found. Additional analysis explored other factors, such as occupational level, age, sex, and educational level, that might account for some of the variation in the scores. The implications of the findings were discussed and recommendations made for further research.

TABLE OF CONTENTS

# I. INTRODUCTION

We are living in the Age of Information. The ability of computers to process and store large amounts of information has made today's organizations increasingly dependent upon them. Computers are critical for the daily operations of most businesses, government agencies and the military services. Moreover, the use of information is becoming ever more important from the broader, strategic perspective of organizations. If an organization is to thrive and grow, managers must be aware of how information can be used to achieve its purposes and goals. Effective management of computer resources will become an increasingly crucial concern for government activities as well as for private enterprises.

Managers of today encounter two types of problems in managing computer resources--technical concerns and personnel issues. Of the two, the tougher problems facing managers are the people problems. They are also more costly. While hardware costs have been decreasing over the last decade, personnel costs have been escalating [Refs. 1:p. 49;2]. Personnel problems are complicated and unrelenting; employee turnover and job dissatisfaction reduce productivity and quality of work, while increasing costs for an organization.

Personnel failings are blamed for many of the persistent problems in systems development. Because people are the primary resource in the software development process, the shortage of capable and skilled personnel is of particular concern [Refs. 2;3:pp. 253,617]. Exacerbating the situation are the turnover and job dissatisfaction problems. Studies have shown that information systems (IS) employees who are satisfied with their jobs in such areas as pay, promotions, supervision, co-workers, and in the work itself are less apt to quit their jobs [Ref. 1:p. 51]. Research has also suggested that IS professionals value jobs that offer stimulating work and opportunities for achievement and growth, and place less emphasis on pay issues than is commonly thought [Ref. 1:p. 50]. Thus jobs must not only provide ample monetary compensation, but also, and perhaps more importantly, opportunities for personal growth and development. Otherwise, the turnover problem will continue to plague managers.

Other problems in the software development process can be related to failures in interpersonal communication. Communication between users and information systems personnel is often poor. Systems are frequently developed with inadequate understanding of user requirements, resulting in poor quality and customer dissatisfaction. In addition, most software projects require cooperation and coordination among project team members. If good group

dynamics do not exist, the system may take longer to complete and the quality may suffer.

Communication and management skills also have implications for the career paths of IS personnel. Traditionally, data processing (DP) managers have been promoted on the basis of their technical skills and may be ill prepared in communications and management skills [Refs. 1:p.51;4:p. 26]. However, information systems technology is taking on an increasingly strategic role in the organization. If DP/IS professionals and managers are to be "promotable" and to have the ability to compete with non-IS people, business knowledge and management skills must be acquired along with technical knowledge [Ref. 1:p. 54].

If IS personnel are likely to compete with professionals and managers outside the IS field, the question might be raised as to whether or not IS people are really different from non-IS people in communications skills and in motivational needs for achievement and growth. Answers to such questions may have implications for the career paths of IS professionals and for the management of systems development and other project teams. It also might be asked if jobs in the IS field hold more motivating potential than jobs in other occupations. Answers to this question may have implications for job design issues.

Research on this subject has been limited and the findings inconclusive. It is the purpose of this paper to

further investigate such motivational issues. The study examines the available literature in this area and extends the research by conducting a survey of IS and non-IS personnel concerning motivational factors. Differences between IS and non-IS personnel within three occupational groups are examined. Characteristics such as growth need, attitudes towards teamwork, as well as attitudes towards technology and changes in the work environment are considered. In addition, differences in the motivating potential of their jobs are investigated.

The research that is presented in the remaining chapters is organized in the following manner. Chapter II presents a brief review of the relevant literature, rationale for the present study, and the research hypotheses. The methodology used for the study is discussed in Chapter III. Chapter IV presents the results, while Chapter V discusses those results and offers some additional analysis. In Chapter VI conclusions are drawn and recommendations made for future studies.

A word should be said about the terminology used in this paper. The terms IS (information systems) and DP (data processing) may be used interchangeably. DP is an older, more traditional term. IS is a newer expression, implying a broader view of the information technology world.

## II. BACKGROUND

### A. REVIEW OF THE LITERATURE

Bartol and Martin note that while research concerning personnel issues in the management of information systems (MIS) field is limited, there is some available research concerning personality dimensions. In their review of the literature, they have found that IS professionals are similar to non-IS professionals in their high needs for achievement and growth. However the researchers point out that these needs may be even higher for IS professionals. [Ref. 1:p. 50]

A few studies have compared the personality profiles of IS personnel with non-computer people. Woodruff [Ref. 5] compared personality need characteristics of 202 data processing personnel with those of the general population. The Personality Research Form was used to measure 20 individual needs identified in Murray's Variables of Personality. Woodruff found that both male and female DP survey participants scored higher than the general population in the need for achievement (aspires to accomplish difficult tasks and to attain excellence) and in cognitive structure (dislikes ambiguity, desiring to base decisions on definite knowledge). He also found that DP personnel scored lower than the general average in the need for affiliation (enjoys people and makes efforts to maintain

association). This was particularly true for the DP females.

Couger and Zawacki [Ref. 4] have done extensive research in the field of motivational factors of IS personnel. They surveyed more than 2500 IS professionals, managers, and operations personnel, who represented a wide variety of organizations in all geographic areas of the United States. The researchers selected the Job Diagnostic Survey (JDS), developed by Hackman and Oldham [Ref. 6], for their survey instrument, and expanded it to include elements particular to the computer field. Couger and Zawacki chose the JDS because of its established validity and reliability, and for its extensive database that could be used for comparison purposes. The researchers controlled for occupational level differences by first classifying the IS personnel into one of three occupational groups and then comparing the data with the analogous group in the general population database established by Hackman and Oldham. These occupational groups were professional/technical, managerial, and clerical/ operations. [Ref. 4]

Couger and Zawacki found that IS personnel in all three occupational groups scored higher in growth need strength than did the corresponding non-IS groups. They also reported substantially lower scores in social need strength (the need to interact with others) for IS professionals and

managers as compared to their general population counterparts. [Ref. 4]

In addition to these individual differences, Couger and Zawacki found some differences in the motivating potential of jobs in the IS field as compared to jobs in other occupations. In the managerial category, jobs in the IS field were scored higher in motivating potential than were jobs in the general population. The reverse was found for the clerical/operations group. No differences between IS and non-IS persons were noted in the professional/technical category. [Ref. 4]

Thus there is some support for the notion of motivational differences between IS and non-IS personnel. Bartol and Martin note the limited but consistent findings that IS professionals and managers appear to have relatively low social needs, even when different measures are used. However, they recommend replication with motivational measures that are broader in scope before the results can be accepted with confidence. [Ref. 1:p. 57]

Ferratt and Short [Ref. 7] have not found the motivational differences that other researchers have found. Their methodology was different from previous studies in that their focus was on motivators of productive work behavior rather than on general motivators. The motivators in their study were measured by means of a "constrained choice" checklist, and included such needs as esteem,

social, achievement, guidance, and power. Both IS and non-IS personnel were participants, a departure from previous studies that used normative data as representing the non-IS population. The same control for occupational differences used by Couger and Zawacki was also used in this study. Motivational patterns of IS personnel were compared with the patterns of non-IS personnel in the same occupational group. No significant differences were found for any group, thus contradicting the findings from previous studies. [Ref. 7]

It is therefore apparent that before conclusions are made with regard to motivational differences between IS and non-IS personnel, further research is needed.

## B. RATIONALE FOR THE RESEARCH

Due to the limited number of studies done, and the somewhat inconsistent results, it was thought worthwhile to extend the research in the area of motivational differences. Because Couger and Zawacki have done the most extensive research in this area, it was decided to attempt to replicate some of their findings. Therefore, a survey, using the JDS as the instrument, was deemed to be the appropriate method for the present study.

Another reason to replicate the study was that the Couger and Zawacki study was done prior to 1980. Since that time the information technology field has been in constant flux with structural and technological changes that may have altered its character. Thus the findings may be different.

However, in spite of the time difference between the Couger and Zawacki study and the present one, it was expected that similar results for individual growth needs and for the motivating potential of jobs would be found. In addition, it was assumed that comparable findings would be obtained for social need strength.

Couger and Zawacki define social need strength as "a measure of the degree to which the employee wants to interact and socialize with other employees both on and off the job." [Ref 4:p. 151] As reported in the literature review, Couger and Zawacki found that social need for IS professionals and managers was significantly lower than for their non-IS colleagues; the implication was that IS personnel are less likely to work effectively in a group or team environment than are non-IS people. Thus, the productivity benefits that are presumed to result from such group structures as the Chief Programmer Team concept may not be forthcoming. However, Couger and Zawacki feel that this lack of need for social interaction does not mean that project teams should not be used, but rather, that frequency and length of group meetings should be kept to a minimum. [Ref. 4:p. 27].

Social interaction skills are an important factor in the ability to communicate effectively. Communication skills are critical in systems development efforts. Bartol and Martin note that to make systems "user friendly," user needs

must be fully understood. They contend that effectiveness in such group strategies as chief programmer teams and project management efforts requires knowledge of group dynamics and group leadership skills. [Ref. 1:p. 64]

It was thought worthwhile to further explore the "team experience" concept, and to employ the social need construct that Couger and Zawacki used. Unfortunately, the items that Couger and Zawacki used to measure social need were not available for use or for study. However, upon further thought, it was thought perhaps more pertinent to examine group issues using a construct that measures a person's proclivity for group interaction rather than merely a person's desire to socialize with others. Thus a new construct was developed in order to investigate the possibility of differences between IS and non-IS personnel in their inclination towards working in teams. This measure is called group interaction strength, and is defined as the degree to which a person desires to work with others as part of a group or team.

In addition to group interaction strength, it was also thought worthwhile to examine some other factors that may affect motivation. Because the subject of motivation is so vast in scope, just two additional elements were considered. These factors are attitudes towards advanced technology and attitudes towards changes in the work environment.

It has been said that the providing of opportunities for technical growth is a key element in reducing turnover of personnel in the IS field. In addition, technically stimulating endeavors that use leading-edge technology tend to maintain staff morale and interest. [Ref 3:p. 272]. Thus organizations that offer their IS personnel opportunities to work with "state of the art" technologies may have an easier time attracting and retaining people. An implication of this view is that people choosing professions or jobs in the IS field may have an affinity for technology that non-IS people may not share. In order to explore this notion as a possible motivational factor, and as a source of difference between IS and non-IS employees, a construct called advanced technology strength was developed. It is defined as the degree to which the person desires the opportunity to work with the latest, or leading-edge technology, including equipment and procedures.

A belief seemingly held by many is that people naturally resist change. Changes in the work environment and in job procedures are not always well-accepted by the people they affect. In the field of information technology, changes are frequent. Changes occur not only in hardware and other technologies, but in software development procedures, such as structured programming and project management techniques. Given this continually evolving environment, the resistance to change may be a particularly troubling problem.

Pressman, in his book on software engineering, makes this relevant comment:

> We all resist change. It is truly ironic, however, that while computing potential (hardware) experiences enormous change, the software people responsible for tapping that potential often oppose change when it is discussed and resist change when it is introduced. [Ref. 2:p. 15]

On the other hand, change can be beneficial, encouraging innovation, and preventing boredom and feelings of stagnation for personnel. Thus, to provide the means to investigate possible differences between IS and non-IS personnel in attitudes towards change, the change acceptance strength construct was developed. It is defined as the degree to which the person positively accepts changes in the way a job is performed and in the work environment itself.

## C. HYPOTHESES

This study addresses the subject of IS/non-IS dissimilarities by examining the possible differences in two areas: the individual and the job. The first area concerns individual motivators, involving the constructs of growth need strength, group interaction strength, and attitudes towards change and technology. The second area addresses the characteristics of an individual's current job, and the motivating potential of that job for the individual performing it.

Making conclusions about such differences based upon a division of personnel into the broad groupings of IS and non-IS may be simplistic and misleading. To state that

there may be motivational differences between IS and non-IS people, or that jobs in the IS field have a higher or lower motivational potential than do jobs in the non-IS field, is to ignore the differences in occupational levels of the two groups. Therefore, the control for occupational level differences used by Couger and Zawacki, and Ferratt and Short, is also followed in this study.

In the area of individual motivation the following null hypotheses were tested.

Within the same occupational group:

H1. There are no differences between IS and non-IS personnel in growth need strength.

H2. There are no differences between IS and non-IS personnel in group interaction strength.

H3. There are no differences between IS and non-IS personnel in attitudes toward opportunities to work with the latest, or leading edge technology.

H4. There are no differences between IS and non-IS personnel in attitudes toward changes in job procedures or in the work environment.

This study also used the job itself as the unit of analysis. The following null hypothesis was tested.

H5. Within the same occupational group, there are no differences in the motivating potential of jobs in the IS field as compared with jobs in the non-IS field.

The results of the hypotheses testing are presented in Chapter IV.

# III. METHODOLOGY

## A. GENERAL APPROACH

Data was collected by means of a survey administered via the mail. A total of 500 surveys were sent to 14 organizations. Efforts were made to obtain representation from a variety of organizations and from different areas of the United States. The types of organizations that agreed to take part were manufacturing, service, governmental, and educational, and were geographically dispersed throughout the west, midwest, and eastern sections of the country. Although involvement of a greater number of organizations was sought, difficulties were encountered in recruiting their participation.

Participation of the organizations was obtained through telephone contact with an executive or other responsible person at the organization. The surveys were mailed to the point-of-contact who was given instructions to distribute them to equal numbers of IS and non-IS personnel. Potential participants were informed that taking part in the survey was voluntary and that responses would be kept confidential. In order to encourage honest answers to the questions, participants were instructed to mail their completed answer sheets directly to the researcher. A return envelope was provided for that purpose.

## B. THE SURVEY INSTRUMENT

The survey instrument used was the Job Diagnostic Survey (JDS), augmented with questions developed by the researcher to obtain measures of constructs not addressed by the JDS. The survey also included a set of general questions to provide information about the respondent. These questions were of a demographical or biographical nature, furnishing such information as job category, job title, age, sex, and educational level.

### 1. The Job Diagnostic Survey

The JDS, developed by Hackman and Oldham, is designed to aid researchers in two ways: (1) in determining if and how a job might be redesigned to improve employee motivation, and (2) in evaluating the effects of redesigned jobs [Ref. 8:p. 159]. The JDS has been used by researchers in the IS field, most notably, Couger and Zawacki [Ref. 4].

The JDS was chosen because of its use in prior, similar studies. Evidence for its reliability and validity is reported by Hackman and Oldham [Ref. 8:p. 164].

The JDS provides measures of numerous constructs. The constructs in the JDS are measured by the responses to a number of questions, each item using a seven-point response scale. For example, the participant is asked to indicate via the response scale as to how much he/she agrees with a particular statement, or how accurately a statement describes his/her job. A summary score for each construct

is produced by averaging the responses to the items that measure it. For details about the rationale for the JDS instrument, and for a copy of the questionnaire itself and its scoring key, see Refs. 6 and 8.

a. The Theory and Principal Constructs[1]

The JDS is based on theory developed by Turner and Lawrence and by Hackman and Lawler. This theory, expanded and refined by Hackman and Oldham, is described below so that the reader can gain an understanding of the concepts that the instrument measures. [Ref. 8:p. 160]

The Hackman/Oldham model of the basic theory is graphically represented in Figure 1. The model depicts the interrelationships among core job characteristics, psychological states of the person, personal/job outcomes, and the person's growth need strength. The theory suggests that when three "critical psychological states" exist for an employee, high levels of internal work motivation, quality job performance and work satisfaction will result; moreover, absenteeism and turnover will decline. These psychological states are: experienced meaningfulness of the work, experienced responsibility for the outcomes of the work, and knowledge of the results.

Hackman and Oldham define the three psychological states as follows:

---

[1]Information for this section, including Figure 1, is drawn from [Ref. 8:pp. 159-170].

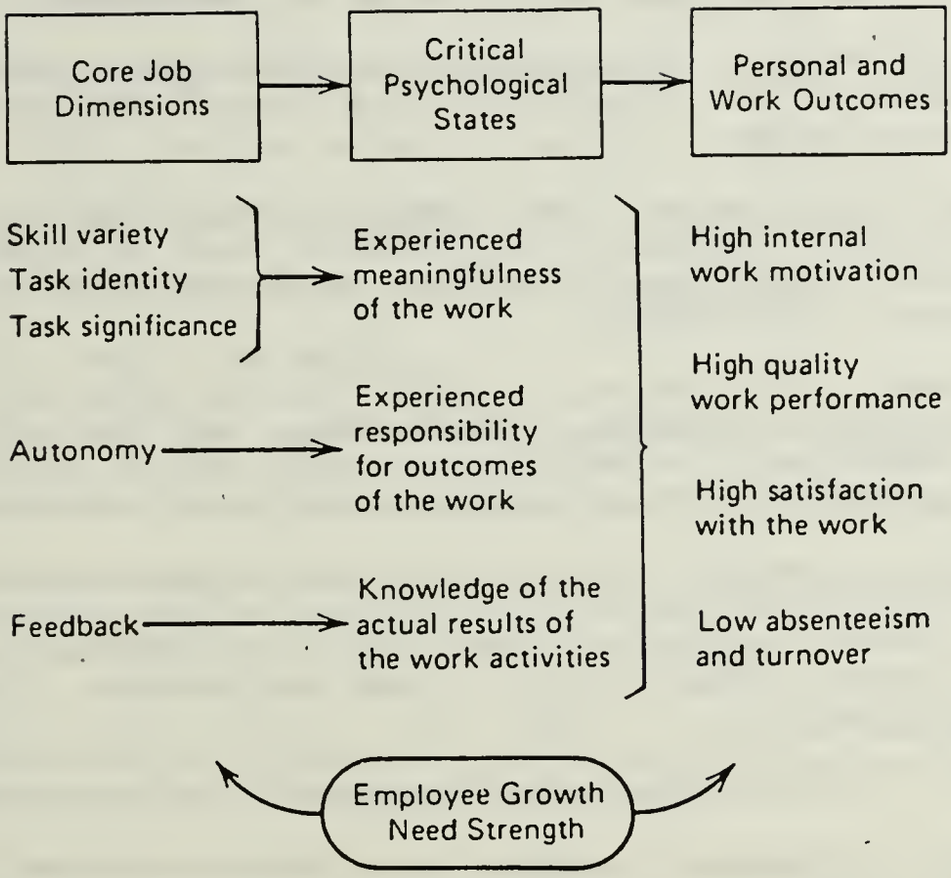



Figure 1. The Job Characteristic Model

- Experienced meaningfulness of the work. The degree to which the person experiences the job as one which is generally meaningful, valuable, and worthwhile.
- Experienced responsibility for work outcomes. The degree to which the individual feels personally accountable and responsible for the results of the work he/she does.
- Knowledge of results. The degree to which the person continually knows and understands how effectively he/she is performing the job. [Ref. 8:p. 162]

The theory further relates that the three psychological states are produced by the presence of five job characteristics, called core job dimensions. The core job dimensions are defined below as:

- Skill Variety. The degree to which a job requires a variety of activities which involve the use of a number of different skills and talents of the person.

- Task Identity. The degree to which a job allows opportunity for completion of a "whole" and identifiable piece of work.

- Task Significance. The degree to which the job has a substantial impact on the lives or work of other people, either internally within the organization or in the external environment.

- Autonomy. The degree to which the job provides considerable freedom, independence, and discretion to the employee in scheduling the work and in determining the procedures to be used in carrying it out.

- Feedback from the job itself. The degree to which performing the required activities of the job results in the person receiving direct and clear information about the effectiveness of his or her performance. [Ref. 8: pp.161-162]

From these core dimensions, the JDS provides a formula to calculate a summary score that assesses the motivating potential of a job. This score is called the Motivating Potential Score (MPS), and is computed as follows:

$$MPS = (\text{Skill Variety} + \text{Task Identity} + \text{Task Significance})/3 \times \text{Autonomy} \times \text{Feedback}$$

The motivating potential of a job affects people in different ways. People who value opportunity for personal growth and accomplishment should respond positively to a job high in motivating potential. On the other hand, persons who do not have such high growth needs may feel

"overstretched" by the job. Conversely, a job that is low in motivating potential will likely frustrate or bore a person with a high need for achievement. Thus, growth need strength (GNS), or the extent to which an individual values personal growth and development, is the moderator of the other relationships in the Hackman/Oldham model.

b. Other JDS Measures

The JDS provides some additional measures. Two of the measures describe job characteristics or dimensions, while the remaining constructs concern affective reactions to the job. The job dimension measures are:

- Feedback from agents. The degree to which the person receives clear information about his or her performance from supervisors or from co-workers.
- Dealing with others. The degree to which the job requires the person to work closely with other people. [Ref. 8:p. 162]

The affective constructs refer to the personal outcomes of the job. Personal and work outcomes are shown in the job characteristics model (Figure 1). While the JDS cannot provide statistical data on work outcomes, such as turnover or absenteeism, it does measure the personal reactions that one gets from the performance of a job. These measures are:

- General satisfaction. An overall measure of the degree to which the employee is satisfied with the job.
- Internal work motivation. The degree to which the employee is self-motivated to perform the job effectively.

- Specific satisfactions. These measures provide assessment of satisfaction with:
  - job security.
  - pay and other compensation.
  - peer and co-workers (social satisfaction).
  - supervision.
  - opportunities for personal growth and development (growth satisfaction). [Ref. 8:p. 162]

2. The Additional Measures

The JDS thus provides measures of GNS for an individual, and MPS for the individual's job. However, in order to explore other factors that may affect individual motivation, a number of additional questions were written that were intended to measure three other constructs. These measures are:

- Group interaction strength (GIS). The degree to which a person desires to work with others as part of a group or team.
- Advanced technology strength (ATS). The degree to which the person desires the opportunity to work with the latest, or "leading edge" technology, including equipment and procedures.
- Change acceptance strength (CAS). The degree to which the person positively accepts changes in the way a job is performed and in the work environment itself.

The questions that were developed to measure each of these constructs are found in Appendix A.

The items composing each of the additional measures were analyzed for internal consistency reliabilities. The

Statistical Package for the Social Sciences, SPSS-X[2] was used to calculate Cronbach's Alpha for each of the new measures. The results are presented in Table 1.

TABLE 1

INTERNAL CONSISTENCY RELIABILITIES

| Variable | Number of Items | Reliability |
|---|---|---|
| GIS | 4 | .76 |
| ATS | 2 | .64 |
| CAS | 4 | .50 |

Nunnally states that when developing new measures for a construct, modest reliabilities of .60 or .50 are sufficient for use in the early phases of research [Ref. 9:p. 226]. According to this guideline, the above results suggest that the internal consistency reliabilities are satisfactory.

C. THE SAMPLE

Of the 500 surveys mailed, 203 were returned, for a response rate of 40.6%. Of those 203, four were not usable, due to incomplete answers in portions of the survey. The useable, or adjusted response rate was 39.8%.

On the basis of answers to biographical questions, respondents were classified as IS or non-IS, and were placed

---

[2]SPSS-X is a registered trademark of SPSS Inc.

in one of the three occupational categories of professional/ technical, managerial, and clerical/operations. Some examples for the categories are:

- IS professional/technical: programmer/analysts, database administrators, technical advisors, and consultants.
- Non-IS professional/technical: accountants, university professors, and health professionals.
- IS clerical/operations: computer operators and data entry personnel.
- Non-IS clerical/operations: secretaries, office clerks, various lab and engineering assistants.

While the managerial category is self-explanatory, it should be noted that both IS and non-IS groups included first-line supervisors as well as middle and upper levels of management.

Of the 199 total respondents, 65% were IS and 35% were non-IS. By occupational group the respondents were: professional/technical 53.8%, managerial 22.6%, and clerical/operations 23.6%. See Appendix B for detailed breakdowns of the participants by occupational group, sex, age, and educational level.

## D. THE VARIABLES

Both classification and continuous variables were used in this study. Classification variables, also known as categorical or nominative variables [Ref. 10:p. 435], were obtained from the respondents' answers to the biographical/ demographical questions. Examples of these variables

include job category, job field, age, sex, and educational level. All independent variables used in this research are classification variables, hereupon referred to as categorical variables. The continuous variables, representing interval scales, are the dependent variables in this study; they are the summary scores of the construct measures.

In this study, participants are classified in two ways: by job category and whether or not they are in the IS field. Thus independent variables are the categorical variables of job field and job category. Job field has two values: IS or non-IS. Job category has three levels: professional/ technical, managerial, and clerical/operations.

To test the hypotheses, five dependent variables are identified: motivating potential score (MPS), growth need strength (GNS), group interaction strength (GIS), advanced technology strength (ATS), and change acceptance strength (CAS). The values for the dependent variables of GNS, GIS, ATS, and CAS are the respondents' summary scores obtained for each of the measures. MPS is derived by the formula described earlier.

In addition, the job characteristics variables that make up MPS, as well as the variables for experienced psychological states and affective outcomes are used for comparison purposes in this study. These variables include:

- skill variety.
- task identity.
- task significance.
- autonomy.
- feedback from the job itself.
- experienced meaningfulness of the work.
- experienced responsibility for work outcomes.
- knowledge of results.
- feedback from agents.
- dealing with others.
- general satisfaction.
- internal work motivation.
- job security satisfaction.
- pay satisfaction.
- social satisfaction.
- growth satisfaction.

## E. ANALYTICAL PROCEDURES

The participants' answers to the augmented JDS questionnaire were scored via a Lotus 1-2-3[3] program to produce a summary score for each variable. The summary scores and the categorical variables were then input into a file and the data analyzed with SAS[4] statistical procedures. One-way analysis of variance was conducted to test the

---

[3]Lotus 1-2-3 is a registered trademark of the Lotus Development Corporation.

[4]SAS is a registered trademark of SAS Institute, Inc.

hypotheses. The SAS ANOVA procedure was used, with job field as the independent variable, processed in subsets by job category. (Although the data in this study is unbalanced, the ANOVA procedure may be used for unbalanced data if there is only one independent variable [Ref. 10:p. 16].) The ANOVA procedure was supplemented with the MEANS option to produce the IS and non-IS means for each dependent variable.

Although not part of the hypothesis testing, the ANOVA procedure was used to analyze the job characteristic, psychological state, and affective outcome variables listed in the previous section. In addition, to obtain standard deviations, the SAS procedure MEANS was run for all of the non-categorical variables.

## IV. RESULTS

The results of the hypothesis testing by occupational group are presented for each dependent variable in Tables 2-6. All of the null hypotheses were tested at a 5% significance level.

Hypothesis 1 states that within the same occupational group there are no differences between IS and non-IS personnel in GNS. The results for the hypothesis test are shown in Table 2.

TABLE 2

HYPOTHESIS TEST RESULTS FOR GNS

| Job Category | Mean | F value | p value |
|---|---|---|---|
| Professional/Technical | 5.32 | 0.10 | 0.749 |
| Managerial | 5.39 | 1.57 | 0.217 |
| Clerical/Operations | 5.11 | 0.67 | 0.417 |

All p values were greater than the significance level of .05. Hypothesis 1 is therefore not rejected for any job category.

Hypothesis 2 states that within the same occupational group there are no differences between IS and non-IS personnel in GIS. The results for the test of this hypothesis are presented in Table 3.

TABLE 3

HYPOTHESIS TEST RESULTS FOR GIS

| Job Category | Mean | F value | p value |
|---|---|---|---|
| Professional/Technical | 4.66 | 0.81 | 0.371 |
| Managerial | 4.84 | 0.09 | 0.762 |
| Clerical/Operations | 4.54 | 1.47 | 0.232 |

Since all p values were greater than .05, Hypothesis 2 is not rejected for any job category.

Hypothesis 3 says that within the same occupational group, there are no differences between IS and non-IS personnel in ATS. Table 4 presents the results of the hypothesis test.

TABLE 4

HYPOTHESIS TEST RESULTS FOR ATS

| Job Category | Mean | F value | p value |
|---|---|---|---|
| Professional/Technical | 5.88 | 7.91 | 0.006 |
| Managerial | 5.47 | 2.40 | 0.128 |
| Clerical/Operations | 6.01 | 0.46 | 0.501 |

According to the levels of significance found for each job category, Hypothesis 3 is rejected for the professional/ technical category, but is not rejected for the clerical/ operations and managerial categories.

Hypothesis 4 states that within the same occupational group, there are no differences between IS and non-IS personnel in CAS. The results for the hypothesis test are found in Table 5.

TABLE 5

HYPOTHESIS TEST RESULTS FOR CAS

| Job Category | Mean | F value | p value |
|---|---|---|---|
| Professional/Technical | 4.57 | 0.02 | 0.880 |
| Managerial | 4.80 | 1.97 | 0.168 |
| Clerical/Operations | 5.04 | 0.00 | 0.972 |

All p values were greater than .05. Hypothesis 4 is therefore not rejected for any job category.

Hypothesis 5 says that within the same occupational group, there are no differences between IS and non-IS personnel in MPS. Table 6 shows the hypothesis test results.

TABLE 6

HYPOTHESIS TEST RESULTS FOR MPS

| Job Category | Mean | F value | p value |
|---|---|---|---|
| Professional/Technical | 160.87 | 0.78 | 0.381 |
| Managerial | 183.09 | 0.01 | 0.916 |
| Clerical/Operations | 151.87 | 1.73 | 0.195 |

Hypothesis 5 is not rejected for any job category since all p values were greater than .05.

Summaries of the results from the hypothesis tests are presented by job category in Tables 7-9. Included in the tables are the means for IS and non-IS respondents.

It should be noted that the possible values for MPS theoretically range from a low of 1 to the highest possible value of 343. The highest score in the total sample of 199 respondents was 305.41, while the lowest was 20.74. The possible values for the variables GNS, GIS, ATS, and CAS range from 1 to 7; actual minimum and maximum scores were 1 and 7 respectively.

Table 7 summarizes the results for the professional/ technical job category.

TABLE 7

PROFESSIONAL/TECHNICAL RESULTS SUMMARY

| Variable | IS Mean | Non-IS Mean | F value | p value |
|---|---|---|---|---|
| MPS | 163.11 | 149.81 | 0.78 | 0.381 |
| GNS | 5.31 | 5.37 | 0.10 | 0.749 |
| GIS | 4.71 | 4.43 | 0.81 | 0.371 |
| ATS | 6.00 | 5.28 | 7.91 | 0.006 |
| CAS | 4.56 | 4.60 | 0.02 | 0.880 |

Although the MPS mean for the IS professional/technical group is higher than for the non-IS group, the difference is not significant. GIS for both groups appears low, although it is slightly higher for the IS group, the direction of difference opposite of what might have been expected. Differences in the means between the two groups for GNS and CAS are negligible. The only significant difference found between IS and non-IS professionals is in ATS. With an IS mean of 6.00 and a non-IS mean of 5.28, the difference is in the expected direction. Thus IS professionals appear to have a greater desire for the opportunity to work with leading edge technology.

Results for the managerial category are summarized in Table 8.

TABLE 8

MANAGERIAL RESULTS SUMMARY

| Variable | IS Mean | Non-IS Mean | F value | p value |
|---|---|---|---|---|
| MPS | 182.37 | 184.08 | 0.01 | 0.916 |
| GNS | 5.50 | 5.24 | 1.57 | 0.217 |
| GIS | 4.89 | 4.78 | 0.09 | 0.762 |
| ATS | 5.69 | 5.16 | 2.40 | 0.128 |
| CAS | 4.63 | 5.03 | 1.97 | 0.168 |

The MPS mean for IS and non-IS managers was virtually equal. As with the professional/technical group, GIS for IS managers was slightly higher than for their non-IS counterparts. While not significant, GNS and ATS was higher for IS managers, a finding in the expected direction. Non-IS managers had a higher CAS than did IS managers, although not significantly. Overall, there were no significant differences between IS and non-IS managers.

The results for the clerical/operations job category are summarized in Table 9.

TABLE 9

CLERICAL/OPERATIONS RESULTS SUMMARY

| Variable | IS Mean | Non-IS Mean | F value | p value |
|---|---|---|---|---|
| MPS | 136.66 | 159.00 | 1.73 | 0.195 |
| GNS | 5.22 | 5.06 | 0.67 | 0.417 |
| GIS | 4.86 | 4.39 | 1.47 | 0.232 |
| ATS | 6.13 | 5.95 | 0.46 | 0.501 |
| CAS | 5.05 | 5.04 | 0.00 | 0.972 |

MPS for the non-IS clerical/operations group was higher than for the IS group, while the reverse was true for the GNS means. Neither of the differences were significant. Both GIS and ATS means were higher for the IS group as compared with the non-IS personnel. CAS for both groups

were virtually the same. Thus, no significant differences were found between the IS and non-IS people in the clerical/operations category.

Although this study found no significant differences between IS and non-IS persons in MPS for any of the job categories, it may be instructive to take a closer look at the core job dimension variables that make up MPS. The JDS identifies five job characteristics that contribute to the overall motivating potential of a job. While Hackman and Oldham speak of the "multiplicative relationship" among the components of the MPS [Ref. 8:p. 160], it is possible that a low score in one of the three core dimensions of skill variety, task identity, or task significance could be "averaged out" by a high score for another of those variables. (See Chapter III for a review of the MPS formula). Table 10 compares the means for the IS and non-IS personnel by job category for the core job dimensions that compose MPS.

Visual inspection of the table reveals some differences between the two groups in several of the variable scores. In the professional/technical occupational group, task significance and job feedback appear a good deal higher for the IS personnel, while autonomy is higher for the non-IS group. Skill variety and task identity are nearly equal.

In the managerial group a similar pattern occurs. Task significance is higher for IS managers and autonomy higher

TABLE 10

IS AND NON-IS MEANS FOR CORE JOB DIMENSIONS

| Variables by Job Category | IS Mean | Non-IS Mean |
|---|---|---|
| Professional/Technical: | | |
| Skill Variety | 5.66 | 5.63 |
| Task Identity | 5.36 | 5.33 |
| Task Significance | 5.55 | 4.93 |
| Autonomy | 5.33 | 5.89 |
| Job Feedback | 5.39 | 4.59 |
| Managerial: | | |
| Skill Variety | 6.03 | 5.96 |
| Task Identity | 5.12 | 5.16 |
| Task Significance | 6.23 | 6.09 |
| Autonomy | 5.78 | 5.91 |
| Job Feedback | 5.41 | 5.44 |
| Clerical/Operations: | | |
| Skill Variety | 4.67 | 4.96 |
| Task Identity | 4.25 | 5.10 |
| Task Significance | 5.84 | 5.74 |
| Autonomy | 4.87 | 5.45 |
| Job Feedback | 5.49 | 5.49 |

for their non-IS counterparts. As is the case with the professional/technical group, skill variety and task identity are closely matched. With the managers, however, job feedback scores are also nearly the same for the IS and non-IS groups.

The scoring pattern for task significance and autonomy continues in the clerical/operations job category: the IS people rate their jobs higher in task significance, the non-IS score higher in autonomy. As with the managers, the clerical/operations group have equivalent job feedback scores. However, the pattern is broken with skill variety

and task identity. The non-IS people rate their jobs higher in those characteristics than do the IS personnel.

An analysis of variance was conducted to determine if these differences were statistically significant. The results supported some of the above observations. In the professional/technical group, autonomy and job feedback were found to be significantly different for IS and non-IS groups. The F and p values for autonomy were 5.46 and 0.021, respectively. For job feedback, the values were 8.59 and 0.004. Task significance was close to being statistically significant at a level of 0.054.

In the clerical/operations group, one variable was found to be significantly different between the IS and non-IS categories. Task identity had an F of 4.94 and p value of 0.031. In the "almost significant" category was autonomy, with an F of 3.86, and a p of 0.056.

In the managerial occupational group, none of the core job dimension variables were found to differ significantly between the IS and non-IS supervisors.

The IS and non-IS statistics for all of the variables analyzed in this chapter, including the variables for the experienced psychological states and affective outcomes, can be found in Appendix C.

# V. DISCUSSION

## A. COMPARISONS WITH PREVIOUS STUDIES

While some significant differences between IS and non-IS respondents were found in the professional/technical and clerical/operations job categories for three core job dimension variables, the overall MPS scores for IS and non-IS personnel in all job categories were not found to vary significantly. These findings, along with the failure to reject the null hypothesis for GNS differences for any of the occupational groups contrasts with previous research reported by Cougar and Zawacki [Ref. 4]. The lack of agreement could partially be explained by the differences in methodology between the Couger study and the present one. While both studies used the JDS to obtain MPS and GNS scores for participants, there were differences in the types of samples used for comparisons. Couger and Zawacki administered their questionnaire to IS personnel only. Results from their survey were compared with a set of general norms for professional/technical, managerial, and clerical job categories, norms established by a previous Hackman and Oldham study [Ref. 4]. (Appendix E to Ref. 6 reports the normative data of the 1979 study by Hackman, Oldham, and Stepina.) In the present research, both IS and non-IS personnel were participants in the same survey.

The benefits of using the sampling methods of this study are that IS and non-IS respondents are from the same organizations, and data is gathered at the same point in time. On the other hand, the advantage with the Couger study is that a large data base was ready-made for comparison purposes. In the present study, the sample size was much smaller, and difficulties were encountered in getting adequate non-IS representation. (These problems are addressed later in this chapter).

It should be noted that there may be a possible problem in using the normative data as representing the non-IS population. The data in the Hackman, Oldham, and Stepina survey were of a general nature, obtained from employees working in a wide variety of jobs. It is possible, or even probable that some of the general data included inputs from persons working in the computer field. Thus, if these norms are assumed to represent only non-IS personnel, using this data to make comparisons with IS personnel may not result in definitive findings.

Table 11 presents a summary by occupational group of MPS and GNS scores that were found in the present study, as well as the Couger/Zawacki survey results for IS personnel and the Hackman/Oldham/Stepina norms used by Couger and Zawacki in [Ref. 4].

Some variations in the scores can be noted by casual observation. However, a question remains as to how to

TABLE 11

COMPARISON OF MPS AND GNS SCORES
FOR PRESENT AND PREVIOUS STUDIES

| Classification of Respondents | | MPS | GNS |
|---|---|---|---|
| Professional/Technical | | | |
| Present study | IS | 163.1 | 5.31 |
| | Non-IS | 149.8 | 5.37 |
| Couger/Zawacki | IS | 153.6 | 5.91 |
| Hackman/Oldham/Stepina | Non-IS | 153.7 | 5.59 |
| Managerial | | | |
| Present study | IS | 182.4 | 5.50 |
| | Non-IS | 184.1 | 5.24 |
| Couger/Zawacki | IS | 199.1 | 6.32 |
| Hackman/Oldham/Stepina | Non-IS | 155.9 | 5.30 |
| Clerical/Operations | | | |
| Present study | IS | 136.7 | 5.22 |
| | Non-IS | 159.0 | 5.06 |
| Couger/Zawacki | IS | 98.6 | 5.78 |
| Hackman/Oldham/Stepina | Non-IS | 105.9 | 5.00 |

interpret the differences. It has already been reported that the present study has found no significant differences between IS and non-IS persons in GNS or MPS. On the other hand, Couger and Zawacki report substantially higher GNS for IS professionals as compared with all other job categories, and significantly higher scores in MPS and GNS for IS managers as compared to their non-IS colleagues. However, the researchers do not reveal what statistical test was used in these analyses nor do they present the quantified results of such a test. Hackman and Oldham suggest the following guidelines that practitioners can use to determine if a mean

score for a variable is within the normative range for a particular job category:

> If the target scores are less than one standard deviation away from the normative mean, this suggests that there is an insignificant difference between the two scores. If the target score is (plus or minus) two or more standard deviations from the focal norm, it suggests that the target job is quite discrepant from the normative base. [Ref. 6:p. 316]

The MPS standard deviations for the professional/technical, managerial, and clerical/operations categories of the normative data were 55, 55, and 59, respectively. For GNS, the numbers for the three categories were .57, .54, and .74, respectively. All of the mean scores in Table 11 were within two standard deviations of the Hackman/Oldham norms. While not a substitute for statistical analysis, the above guideline suggests that the differences Couger and Zawacki found may be within the range of normal variation.

Thus the results of the present survey (and even perhaps the Couger and Zawacki study, based upon the above discussion) tend to support the findings of Ferratt and Short [Ref. 7] that IS personnel are motivationally similar to non-IS persons in their respective job categories.

While scores for MPS and GNS can be compared to scores from prior studies, the results for ATS and CAS cannot, since these variables represent newly developed constructs of an exploratory nature. In this same vein, although strict comparisons cannot be made between GIS and Couger's social need strength (SNS), certain similarities exist that

may permit limited comparisons. While GIS and SNS do not measure the same thing, comparable findings for GIS and SNS could lead to similar implications. Cougar found SNS to be substantially lower for IS professionals and managers than for their non-IS counterparts. The implication is that IS professionals and managers do not have a proclivity for group interaction and that productivity benefits resulting from such "team concepts" as the chief programmer team approach should be viewed with caution [Ref. 4:p. 27]. The same implications could be made if similarly low scores were found for GIS. However, the current study has found contrasting results for GIS. No significant differences were found between IS and non-IS persons in any of the three occupational groups. Furthermore, while not significant, the differences in the GIS scores were in the opposite direction to what Couger found. In all occupational groups, the IS people scored higher than their non-IS comparators.

A question might be raised as to what Couger and Zawacki used to measure SNS. While the JDS as developed by Hackman and Oldham does not include a measure for SNS by that or any other name, Couger and Zawacki refer to findings of SNS for the "non-IS" data from the Hackman/Oldham norms as well as for the IS groups that they surveyed [Ref. 4]. It is unclear as to how these scores were derived. The only possible JDS candidate for such a score is the construct called social satisfaction, which is not the same measure as

the strength of a need for social interaction. Since Couger and Zawacki view the SNS findings as very important, clarification should be made as to how the measure was obtained.

## B. ADDITIONAL ANALYSIS

Although virtually no differences between IS and non-IS personnel were found thus far, in order to exhaust all possibilities, one final avenue remained to be explored. The Couger and Zawacki sample for the IS professional/ technical group was composed of analysts, programmer/ analysts, and programmers. Because the corresponding sample in the present survey includes IS professional jobs of other descriptions, it was thought to be of some benefit to extract the data for programmer/analysts and use it to make comparisons with the non-IS professionals in the survey. The SAS ANOVA procedure was run on the five dependent variables MPS, GNS, GIS, ATS, AND CAS. The results are displayed in Table 12.

As can be seen, only ATS was found to vary significantly between IS and non-IS professionals. The results are comparable with the results obtained previously for the combined IS professional/technical category. Thus it can be deduced that programmer/analysts are not different from the other IS professionals in this survey. To confirm this, an ANOVA test was run comparing these two groups. As

TABLE 12

PROGRAMMER/ANALYSTS VS NON-IS PROFESSIONALS

| Variable | Mean | F value | p value |
|---|---|---|---|
| MPS | 157.45 | 0.43 | 0.513 |
| GNS | 5.32 | 0.14 | 0.714 |
| GIS | 4.72 | 1.29 | 0.260 |
| ATS | 5.86 | 7.79 | 0.007 |
| CAS | 4.61 | 0.00 | 0.954 |

suspected, no significant differences were found. Table 13 compares the means of the programmer/analysts, other IS professionals, and the non-IS professionals.

TABLE 13

COMPARISON OF DEPENDENT VARIABLES AMONG PROFESSIONAL/TECHNICAL CATEGORIES

| Variable | Programmer/ Analysts | Other IS Professionals | Non-IS Professionals |
|---|---|---|---|
| MPS | 159.50 | 174.12 | 149.81 |
| GNS | 5.31 | 5.33 | 5.37 |
| GIS | 4.80 | 4.45 | 4.43 |
| ATS | 6.02 | 5.93 | 5.28 |
| CAS | 4.61 | 4.40 | 4.60 |

With this last analysis, thoughts of further IS and non-IS comparisons can be put to rest. Because IS and non-IS

categorization has failed to account for the variability of most of the dependent variables tested, it was thought that additional analyses using different independent variables may provide some insights in explaining sources of variation. Some possible sources include sex, age, and educational level. In addition, although occupational level was used as a control in the previous analyses in this study, occupational level in and of itself may be able to explain some of the variation. Thus, SAS ANOVA procedures were used to analyze the data for each of those independent variables. All data was collapsed across IS and non-IS groups. A 5% level of significance was used for all of the tests of the variance in the dependent variables of MPS, GNS, GIS, ATS, and CAS.

Job category was the first independent variable to be tested. Table 14 presents the results of the statistical test.

TABLE 14

OCCUPATIONAL LEVEL RESULTS

| Variable | Mean | F value | p value |
|---|---|---|---|
| MPS | 163.77 | 3.84 | 0.023 |
| GNS | 5.29 | 2.48 | 0.087 |
| GIS | 4.67 | 0.73 | 0.485 |
| ATS | 5.82 | 3.71 | 0.026 |
| CAS | 4.73 | 4.11 | 0.018 |

At a 5% significance level, occupational category was found to significantly contribute to the variability of the MPS, ATS, and CAS scores. On the other hand, occupational level was not found to significantly influence scores for GNS or GIS. The means for the variables tested are displayed in Table 15 for each job category.

TABLE 15

VARIABLE MEANS BY JOB CATEGORY

| Job Category | MPS | GNS | GIS | ATS | CAS |
|---|---|---|---|---|---|
| Professional/ Technical | 160.87 | 5.32 | 4.66 | 5.88 | 4.57 |
| Managerial | 183.09 | 5.39 | 4.84 | 5.47 | 4.80 |
| Clerical/Operations | 151.87 | 5.11 | 4.54 | 6.01 | 5.04 |

Not surprisingly, the scores for MPS and GNS are highest for managers, and lowest for clerical/operations. Somewhat unexpected, however, are the higher scores in ATS and CAS for the clerical/operations group. At least in this sample, clerical/operations personnel have a stronger desire to work with leading edge technology than do their supervisors and professional co-workers. The same group also exhibits a more positive attitude toward changes in the work environment.

Educational level may possibly have some explanatory power for the variance in the survey scores. It may be an intuitive assumption that a person with a high growth need

strength would be likely to aspire to a higher level of education than a person with a low growth need. Similarly, it might be assumed that a more educated person would be more likely to work in a job that has a high motivating potential. Another "intuition" is that educational level may be positively correlated to ATS and CAS. Less is assumed about the effect of education on GIS--it is expected that the effect is probably minimal. In order to provide some empirical basis for the validity of these assumptions about the influence of educational level on these motivational factors, the data were analyzed using educational level as the independent variable. The results of the analysis are shown in Table 16.

TABLE 16

EDUCATIONAL LEVEL RESULTS

| Variable | Mean | F value | p value |
|---|---|---|---|
| MPS | 163.77 | 1.33 | 0.251 |
| GNS | 5.29 | 0.60 | 0.698 |
| GIS | 4.67 | 0.26 | 0.935 |
| ATS | 5.82 | 3.48 | 0.005 |
| CAS | 4.73 | 1.69 | 0.140 |

The results did not support most of the above assumptions. As the table shows, only ATS was found to vary significantly between educational levels. On the other hand,

as suspected, educational level has little relevance for GIS.

In order to see the scoring patterns for ATS and the other variables, Table 17 presents the mean scores for each educational level.

TABLE 17

VARIABLE MEANS BY EDUCATIONAL LEVEL

| Educational Level | MPS | GNS | GIS | ATS | CAS |
|---|---|---|---|---|---|
| High school | 151.13 | 5.05 | 4.44 | 5.70 | 4.82 |
| Some College | 154.18 | 5.24 | 4.66 | 6.10 | 4.96 |
| Business/Technical | 168.53 | 5.36 | 4.81 | 6.09 | 4.40 |
| B.S. or B.A. | 169.69 | 5.31 | 4.68 | 5.81 | 4.82 |
| Some graduate | 149.39 | 5.33 | 4.85 | 5.90 | 4.43 |
| Masters or higher | 179.11 | 5.35 | 4.61 | 5.23 | 4.59 |

It may be of some interest to examine the MPS mean scores. While not statistically significant, the MPS scores followed the expected pattern, with one surprising exception. With a mean of 149.39, the MPS for persons with some graduate level education was even lower than for persons who only completed high school, a somewhat inexplicable finding.

For the only variable found to vary significantly between the groups, the table shows that the highest scores for ATS were observed for persons with some college and for

those completing a technical or business school program, while the lowest scores were produced by persons with a masters degree. However, no linear trend can be observed. Similarly, no trend is noted for GNS, GIS, or CAS.

Age was the next factor to be explored. In a study of end user attitudes by Yaverbaum, the author reports a finding by Hackman, Oldham, and Stepina that MPS scores rise as people grow older and decline after age 50 [Ref.11:p.81]. Yaverbaum, in his own study, also found a similar trend, as well as a finding that GNS increases with age [Ref. 11:p. 82]. To discover if a comparable trend occurs in the present study, and if age accounts for the variance for any of the dependent variables, an ANOVA test was run using age as the independent variable. Table 18 displays the results of the test.

TABLE 18

AGE DIFFERENCE RESULTS

| Variable | Mean | F value | p value |
|---|---|---|---|
| MPS | 163.77 | 0.39 | 0.762 |
| GNS | 5.29 | 1.21 | 0.306 |
| GIS | 4.67 | 0.45 | 0.719 |
| ATS | 5.82 | 1.20 | 0.313 |
| CAS | 4.73 | 0.44 | 0.727 |

While there are no significant differences between age groups for any of the dependent variables, trends may exist for the different construct measures. Table 19 presents the means of the variables tested for each of the age groups.

TABLE 19

VARIABLE MEANS BY AGE

| Age Group | MPS | GNS | GIS | ATS | CAS |
|---|---|---|---|---|---|
| 20 to 29 | 156.31 | 5.25 | 4.80 | 5.91 | 4.79 |
| 30 to 39 | 167.62 | 5.38 | 4.72 | 5.93 | 4.71 |
| 40 to 49 | 165.32 | 5.28 | 4.54 | 5.62 | 4.63 |
| 50 and over | 162.57 | 5.10 | 4.59 | 5.71 | 4.89 |

Although there are no strong trends noted for any of the variables tested, there is some mild support for the trend observed by Yaverbaum for MPS and GNS. Both MPS and GNS increase, then decrease with age. However, in the present study, the scores taper off after age 40.

No meaningful pattern is noted for ATS. For both GIS and CAS, scores steadily decrease with age until age 50, when the scores then increase.

Sex was the last factor to be addressed. With the increasing number of women in the workforce, it was anticipated that there would not be many differences between the sexes, especially in the individual motivational factors. However, the MPS scores, which measure the

motivating potential of a particular job, may prove to differ between male and female respondents. Although more women are working in the business world than have in the past, it remains a common complaint among women that the good, challenging jobs are difficult for women to get. In order to provide some empirical evidence or lack of evidence for this contention, the data were analyzed using sex as the independent variable. The results are summarized in Table 20.

TABLE 20

SEX DIFFERENCE RESULTS

| Variable | Mean | F value | p value |
|---|---|---|---|
| MPS | 163.77 | 1.16 | 0.282 |
| GNS | 5.29 | 0.00 | 0.995 |
| GIS | 4.67 | 0.61 | 0.434 |
| ATS | 5.82 | 3.66 | 0.057 |
| CAS | 4.73 | 2.04 | 0.155 |

Although no significant differences between the sexes were found for any of the independent variables, a comparison of the variable means for male and female may be enlightening. Table 21 presents this data.

It is interesting to note that GNS scores for both sexes are exactly equal while MPS scores for males are higher than female scores. While the MPS differences are not

TABLE 21

VARIABLE MEANS BY SEX

| Sex | MPS | GNS | GIS | ATS | CAS |
|---|---|---|---|---|---|
| Male | 168.16 | 5.29 | 4.61 | 5.68 | 4.63 |
| Female | 159.43 | 5.29 | 4.74 | 5.96 | 4.83 |

significant, these findings nevertheless offer some small amount of support for the complaints of many insufficiently challenged women.

Other interesting findings were for ATS and CAS. At a 5% significance level, ATS, with a p value of .057, was "almost" significant. Perhaps surprisingly, women scored higher than men in this measure. The CAS scores were also higher for women, implying perhaps a possible tendency for women to be more receptive of change. The higher GIS scores for women were less notable.

C. LIMITATIONS OF THE SURVEY

There are some cautions and limitations with this survey that should be noted, particularly in respect to the analyses relating to IS and non-IS differences. Because of the sample sizes and imbalanced nature of the data, generalizations of these findings to the population of IS and non-IS personnel should be viewed with caution. Although the total sample size was a respectable 199, due to the many categories used in this study (three job

categories, each separated into IS and non-IS groups), the sample size should have been larger. In addition, the data collected for each of these categories were highly imbalanced. (See Appendix B for the demographic distributions.)

The problems with unbalanced data are largely due to the problems in doing a survey by mail. Although the points-of-contact at each organization were instructed to distribute the questionnaires equally to IS and non-IS personnel, the actual allocation was out of the researcher's control. In addition, because the surveys were completed at the participants' convenience, many people never found time to respond, or perhaps, chose not to participate. Stone, in his book on research methodology, points out the implications of this problem:

> If questionnaires are mailed to potential respondents the percentage of returned questionnaires may not exceed 50%. Low response rates are a problem in that there are often important differences between the attitudes, opinions, demographic characteristics, etc., of those who return questionnaires and those who don't. To the extent that response rates are low, the results of a study may not be generalizable to the entire set of potential respondents. [Ref. 12:p. 64]

Because of these problems, a better way to conduct a survey would be for the researcher to do it on site, with blocks of times arranged for the participants to complete the survey.

Distribution of the data used for the additional analyses concerning age and educational level, while still unbalanced, was less of a problem. On a positive note, data

for male and female differences were distributed virtually equally, with 99 male and 100 female participants.

Related to the sampling problems noted above was a classification problem. Subjective judgment had to be used in classifying some of the respondents into the three job categories. While many job descriptions were clear-cut, such as programmers, computer operators, and secretaries, other jobs did not fit into such neat categories. A particular problem was in the grouping together of all managers--first line supervisors as well as middle and upper levels of management--into one category. Ideally, more categories could have been used; however, more categories would have required an even larger sample size. In addition, comparisons to previous studies that used the three job categories would have been more difficult.

Another possible limitation of the research has to do with an inherent problem in the questionnaire type of methodology. Because of the self-report nature of a survey, respondents have the ability to "fool" the researcher by giving untruthful answers. Indeed, Hackman and Oldham point out the following:

> The JDS is easily faked, and results may be distorted by tendencies of respondents to present themselves as being consistent in how they respond to various sections of the questionnaire....Special care should be taken to ensure that the respondents believe that their own best interests will be served if the data they provide accurately reflect the objective characteristics of the jobs and their personal reactions to them. [Ref 6:p. 314]

An additional limitation of self-report methodologies is that such studies can only provide information about an individual's perceptions and reactions. While this information is useful, meaningful answers to such complicated issues as job design or individual motivation requires measurement of actual job conditions and such work outcomes as productivity and turnover [Ref. 1:p. 60].

# VI. CONCLUSIONS

## A. SUMMARY

Thus, with the exception of the ATS findings for the professional/technical group, the motivational factors explored in this study have been found to be similar for the IS and non-IS personnel within the same job category. Although there were some observed differences in the means for a number of these variables, these differences were not significant, except for the case noted above. The implication of these findings is that IS and non-IS personnel are more alike than they are not alike, at least in growth needs, group interaction proclivity, and in attitudes toward change.

Similar results were found for the motivating potential of jobs in the IS field as compared to jobs in the non-IS field--no significant differences were found between IS and non-IS personnel within the same occupational categories. Although some significant differences were found in a small number of the core job dimensions that compose MPS in the professional/technical and clerical/operations job groups, the differences were not sufficient to significantly influence the total MPS scores for each category. Thus, while some differences may exist in some job characteristics, in general, jobs in the IS field do not appear to be

very different in overall motivating potential than jobs in other occupations.

The supplementary analysis that was performed for the categorical factors of occupational level, age, sex, and educational level, found some significant differences. Occupational level was found to significantly influence MPS, ATS, and CAS scores. Regarding educational level, ATS was the only measure that varied significantly, a somewhat surprising result. No significant differences in the scores were found among age groups or between male and female personnel.

It should be noted that generalizations of the results of this survey to the general population should be viewed with caution, due to the sample sizes and the data distribution imbalances.

## B. RECOMMENDATIONS

The results from this survey contrasts with results from previous research by Couger and Zawacki and by Woodruff, and agrees with the findings of Ferratt and Short. As discussed in the previous chapter, some of the differences between this study and the Couger and Zawacki survey could be due to differences in the sampling method for the non-IS personnel. Using normative data for non-IS samples may have inherent problems. Non-IS occupations are not all alike. Piano players are probably different from engineers, as are nurses from accountants. However, when all "non-IS" people are

grouped together in one classification, the character of the many and diverse jobs is lost. Thus, comparisons of IS personnel, for whom certain similarities might be assumed, with a monolithic "non-IS" group, seem inappropriate. If such comparisons are to be meaningful, careful controls should be exerted as to what types of groups are being compared. At the least, samples for each group compared should come from the same organization.

A control of this sort was attempted in the present study by drawing both IS and non-IS samples from the organizations that participated in the survey. Ferratt and Short used a similar technique. It is interesting to note that comparable results were found in both studies. However, in the present survey even that control was not sufficient, since the majority of the responses were from IS personnel. To ensure better controls over the sample, it is recommended that, when possible, future surveys be conducted with the researcher on site at each participating organization.

Another lesson that has been learned in the process of doing this study concerns the practical application and the relevance of comparing personality profiles of IS and non-IS people. While such comparisons may be interesting from an abstract viewpoint, and may offer some insights into how IS personnel might be better managed, perhaps more fruitful research could be focused on the personnel issues that are

of concern to IS managers, such as turnover, job satisfaction, and group dynamics issues. As mentioned earlier in this paper, research has found job satisfaction to be negatively correlated with personnel turnover [Refs. 1:p. 51;13:p. 103]. More research needs to focused on understanding the factors related to job satisfaction. In this regard, perhaps the JDS instrument may be insufficient. Goldstein and Rockart [Ref. 13, pp. 103-115] point out that the Hackman and Oldham paradigm was developed to study jobs done by individuals who work more or less independently. However, this may not be the case for many IS professionals. They say that in systems development,

> ...programmer/analysts typically work in teams and spend a great deal of time dealing with users, co-workers, and managers. Therefore, extensions to Hackman and Oldham's model are needed to study the impact of work-related factors, other than job characteristics, on the job satisfaction of programmer/analysts. [Ref. 13:p. 104]

Thus the team approach is becoming more and more the way of life in IS departments and organizations. This trend not only has implications for job satisfaction, but also for group effectiveness. In order for teams to be managed effectively, group dynamics need to be more clearly understood. Bartol and Martin point out that little research has been aimed at group effectiveness in the systems development area [Ref. 1:p. 64]. If project teams and such group concepts as chief programmer teams are to improve productivity, managers must acquire knowledge of

groups structures and processes. Thus group dynamics should prove to be fertile ground for further research.

In conclusion, while there are many challenges ahead for IS managers in effectively managing computer resources, the greatest challenge lies in the managing of the most important of these resources, the human resources. Although the field is technically complex, people are even more complex, further complicating a manager's job. Hackman and Oldham, in their book on work redesign, quote a character from Kurt Vonnegut's book, Player Piano:

> If only it weren't for the people...always getting tangled up in the machinery. If it weren't for them, earth would be an engineer's paradise. [Ref. 6:p. iii]

Fortunately, the world is not an engineer's paradise--people are here to stay. Unfortunately, the people problems are also here to stay, at least as long as there are people. Understanding the problems is the first step in better managing them.

# APPENDIX A

## NEW CONSTRUCT ITEMS

I. GROUP INTERACTION STRENGTH

A. Using the scale below, indicate the degree to which you would like having the following characteristic present in your job.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Would like having this only a moderate amount (or less) | | | Would like having this very much | | Would like having this extremely much | |

1. Opportunities to work with others and to be part of a team.

B. For the question below, two kinds of jobs are described. Indicate which of the jobs you personally prefer, if you had to make a choice between them.

1.

| Job A | Job B |
|---|---|
| A job where you work independently. | A job with very satisfying teamwork. |

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly prefer A | Slightly prefer A | Neutral | Slightly prefer B | Strongly prefer B |

C. How much do you agree with the following statements? Please choose the number below that you most agree with.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Disagree Strongly | Disagree Slightly | Neutral | Agree Slightly | | Agree Strongly | |

1. Meetings are important because of the opportunity to interact with others, gaining new ideas and insights.

2. In general, I would prefer to work by myself rather than as part of a group or team.

II. ADVANCED TECHNOLOGY STRENGTH

A. Using the scale below, indicate the degree to which you would like having the following characteristic present in your job.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Would like having this only a moderate amount (or less) | | | Would like having this very much | | Would like having this extremely much | |

1. Chances to work with the latest, or "state of the art" technology.

B. How much do you agree with the following statement? Please choose the number below that you most agree with.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Disagree Strongly | Disagree Slightly | | Neutral | Agree Slightly | | Agree Strongly |

1. Given the choice, I would like to work in a job which allows me to use the latest technology/ equipment.

III. CHANGE ACCEPTANCE STRENGTH

A. How much do you agree with the following statements?
Please choose the number below that you most agree with.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Disagree Strongly | Disagree Slightly | | Neutral | Agree Slightly | | Agree Strongly |

1. I feel that there are too many changes in my work environment; just when I get used to things, something comes along to upset it.

2. Changes in the way my job is done usually results in an improvement.

3. When it comes to my job, I like to do things "the way I've always done them."

B. Using the scale below, indicate the degree to which you would like having the following characteristic present in your job.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| Would like having this only a moderate amount (or less) | | | Would like having this very much | | Would like having this extremely much | |

1. Frequent changes in my work environment so that there is "never a dull moment."

APPENDIX B

DEMOGRAPHICS

TABLE 22

FREQUENCY BY JOB CATEGORY

| Job Category | IS | Non-IS | Total |
|---|---|---|---|
| Professional/Technical | 89 | 18 | 107 |
| Managerial | 26 | 19 | 45 |
| Clerical/Operations | 15 | 32 | 47 |

TABLE 23

FREQUENCY BY EDUCATIONAL LEVEL

| Educational Level | IS | Non-IS | Total |
|---|---|---|---|
| High School | 6 | 9 | 15 |
| Some College | 33 | 16 | 49 |
| Business/Technical | 16 | 5 | 21 |
| B.S. or B.A. | 43 | 17 | 60 |
| Some Graduate | 17 | 4 | 21 |
| Masters or higher | 15 | 18 | 33 |

TABLE 24

FREQUENCY BY SEX

| Sex | IS | Non-IS | Total |
|---|---|---|---|
| Male | 80 | 19 | 99 |
| Female | 50 | 50 | 100 |

TABLE 25

FREQUENCY BY AGE GROUP

| Age Group | IS | Non-IS | Total |
|---|---|---|---|
| 20 to 29 | 36 | 10 | 46 |
| 30 to 39 | 49 | 26 | 75 |
| 40 to 49 | 29 | 25 | 54 |
| 50 and over | 16 | 8 | 24 |

## APPENDIX C

## SUMMARY OF VARIABLE MEANS AND STANDARD DEVIATIONS

### TABLE 26

### MEANS AND STANDARD DEVIATIONS FOR IS AND NON-IS PROFESSIONAL/TECHNICAL CATEGORY

| | IS | | NON-IS | |
|---|---|---|---|---|
| Variable | Mean | Std Dev | Mean | Std Dev |
| Skill Variety | 5.66 | 0.91 | 5.63 | 1.22 |
| Task Identity | 5.36 | 1.03 | 5.33 | 1.32 |
| Task Significance | 5.55 | 1.19 | 4.93 | 1.48 |
| Autonomy | 5.33 | 0.93 | 5.89 | 0.94 |
| Job Feedback | 5.39 | 1.02 | 4.59 | 1.22 |
| Agent Feedback | 4.39 | 1.20 | 4.28 | 1.25 |
| Dealing with Others | 6.06 | 0.77 | 6.17 | 1.10 |
| Exp Meaningfulness | 5.28 | 0.93 | 5.42 | 1.30 |
| Exp Responsibility | 5.65 | 0.75 | 5.67 | 0.98 |
| Knowledge of Results | 5.21 | 0.97 | 4.94 | 0.86 |
| General Satisfaction | 4.95 | 1.02 | 4.73 | 1.34 |
| Internal Satisfaction | 5.72 | 0.67 | 5.65 | 0.94 |
| Growth Satisfaction | 5.23 | 0.99 | 4.99 | 1.56 |
| Job Security Satisfaction | 5.08 | 1.54 | 4.81 | 1.75 |
| Pay Satisfaction | 4.40 | 1.72 | 3.39 | 1.37 |
| Social Satisfaction | 5.44 | 0.82 | 5.91 | 0.85 |
| Supervision Satisfaction | 4.76 | 1.32 | 4.43 | 1.72 |
| MPS | 163.11 | 57.99 | 149.81 | 60.90 |
| GNS | 5.31 | 0.65 | 5.37 | 0.52 |
| GIS | 4.71 | 1.23 | 4.43 | 1.18 |
| ATS | 6.00 | 0.89 | 5.28 | 1.41 |
| CAS | 4.56 | 0.91 | 4.60 | 1.25 |

TABLE 27

MEANS AND STANDARD DEVIATIONS FOR
IS AND NON-IS MANAGERIAL CATEGORY

| | IS | | NON-IS | |
|---|---|---|---|---|
| Variable | Mean | Std Dev | Mean | Std Dev |
| Skill Variety | 6.03 | 0.69 | 5.96 | 0.99 |
| Task Identity | 5.12 | 1.52 | 5.16 | 1.22 |
| Task Significance | 6.23 | 0.72 | 6.09 | 0.99 |
| Autonomy | 5.78 | 1.01 | 5.91 | 0.69 |
| Job Feedback | 5.41 | 1.01 | 5.44 | 1.11 |
| Agent Feedback | 4.21 | 1.60 | 4.46 | 1.49 |
| Dealing with Others | 6.37 | 0.77 | 6.77 | 0.35 |
| Exp Meaningfulness | 5.74 | 0.76 | 5.88 | 1.13 |
| Exp Responsibility | 5.76 | 0.73 | 6.23 | 0.42 |
| Knowledge of Results | 4.87 | 1.13 | 5.07 | 1.23 |
| General Satisfaction | 5.05 | 1.04 | 4.77 | 1.58 |
| Internal Satisfaction | 5.68 | 0.83 | 6.11 | 0.73 |
| Growth Satisfaction | 5.36 | 1.10 | 5.57 | 0.92 |
| Job Security Satisfaction | 5.19 | 1.54 | 5.51 | 1.16 |
| Pay Satisfaction | 4.69 | 1.57 | 4.34 | 1.92 |
| Social Satisfaction | 5.64 | 0.78 | 5.98 | 0.59 |
| Supervision Satisfaction | 4.42 | 1.81 | 4.90 | 1.61 |
| MPS | 182.37 | 54.29 | 184.08 | 52.09 |
| GNS | 5.50 | 0.60 | 5.24 | 0.77 |
| GIS | 4.89 | 1.22 | 4.78 | 1.25 |
| ATS | 5.69 | 0.94 | 5.16 | 1.37 |
| CAS | 4.63 | 0.96 | 5.03 | 0.88 |

TABLE 28

MEANS AND STANDARD DEVIATIONS FOR IS AND NON-IS CLERICAL/OPERATIONS CATEGORY

| | IS | | NON-IS | |
|---|---|---|---|---|
| Variable | Mean | Std Dev | Mean | Std Dev |
| Skill Variety | 4.67 | 1.30 | 4.96 | 1.31 |
| Task Identity | 4.25 | 1.18 | 5.10 | 1.26 |
| Task Significance | 5.84 | 1.10 | 5.74 | 1.19 |
| Autonomy | 4.87 | 1.09 | 5.45 | 0.87 |
| Job Feedback | 5.49 | 0.90 | 5.49 | 0.86 |
| Agent Feedback | 5.73 | 0.92 | 4.52 | 1.40 |
| Dealing with Others | 5.31 | 1.31 | 5.70 | 0.97 |
| Exp Meaningfulness | 5.72 | 0.80 | 5.23 | 0.88 |
| Exp Responsibility | 5.63 | 0.44 | 5.83 | 0.67 |
| Knowledge of Results | 5.23 | 0.64 | 5.38 | 0.72 |
| General Satisfaction | 5.39 | 1.12 | 5.03 | 0.93 |
| Internal Satisfaction | 5.84 | 0.78 | 5.59 | 0.66 |
| Growth Satisfaction | 5.42 | 1.49 | 5.23 | 0.93 |
| Job Security Satisfaction | 5.57 | 1.41 | 5.33 | 1.47 |
| Pay Satisfaction | 4.97 | 1.46 | 3.95 | 1.86 |
| Social Satisfaction | 5.49 | 1.45 | 5.58 | 1.03 |
| Supervision Satisfaction | 5.64 | 1.26 | 5.25 | 1.42 |
| MPS | 136.66 | 60.71 | 159.00 | 51.05 |
| GNS | 5.22 | 0.73 | 5.06 | 0.59 |
| GIS | 4.86 | 1.04 | 4.39 | 1.34 |
| ATS | 6.13 | 0.85 | 5.95 | 0.85 |
| CAS | 5.05 | 0.71 | 5.04 | 1.11 |

## LIST OF REFERENCES


1. Bartol, K.M., and Martin, D.C., "Managing Information Systems Personnel: A Review of the Literature," MIS Quarterly, Special Issue, December 1982.

2. Pressman, R.S., Software Engineering: A Practitioner's Approach, 2d ed., pp.13-15, McGraw-Hill Book Co., 1987.

3. Cash, J.I., et al., Corporate Information Systems Management: Text and Cases, 2d ed., Irwin, 1988.

4. Couger, J.D., and Zawacki, R.A., Motivating and Managing Computer Personnel, Wiley-Interscience, 1980.

5. Woodruff, C.K., "Data Processing People--Are They Really Different?", Information & Management, Vol.3, No.4, pp. 133-139, October 1980.

6. Hackman, J.R., and Oldham, G.R., Work Redesign, Addison-Wesley, 1980.

7. Ferratt, T.W., and Short, L.E., "Are Information Systems People Different: An Investigation of Motivational Differences," MIS Quarterly, Vol. 10, No. 4, pp. 377-387, December 1986.

8. Hackman, J.R., and Oldham, G.R., "Development of the Job Diagnostic Survey," Journal of Applied Psychology, Vol. 60, No. 2, 1975.

9. Nunnally, J.C., Psychometric Theory, McGraw-Hill Book Co., 1967.

10. SAS Institute Inc., SAS User's Guide: Statistics, Version 5 Edition, 1985.

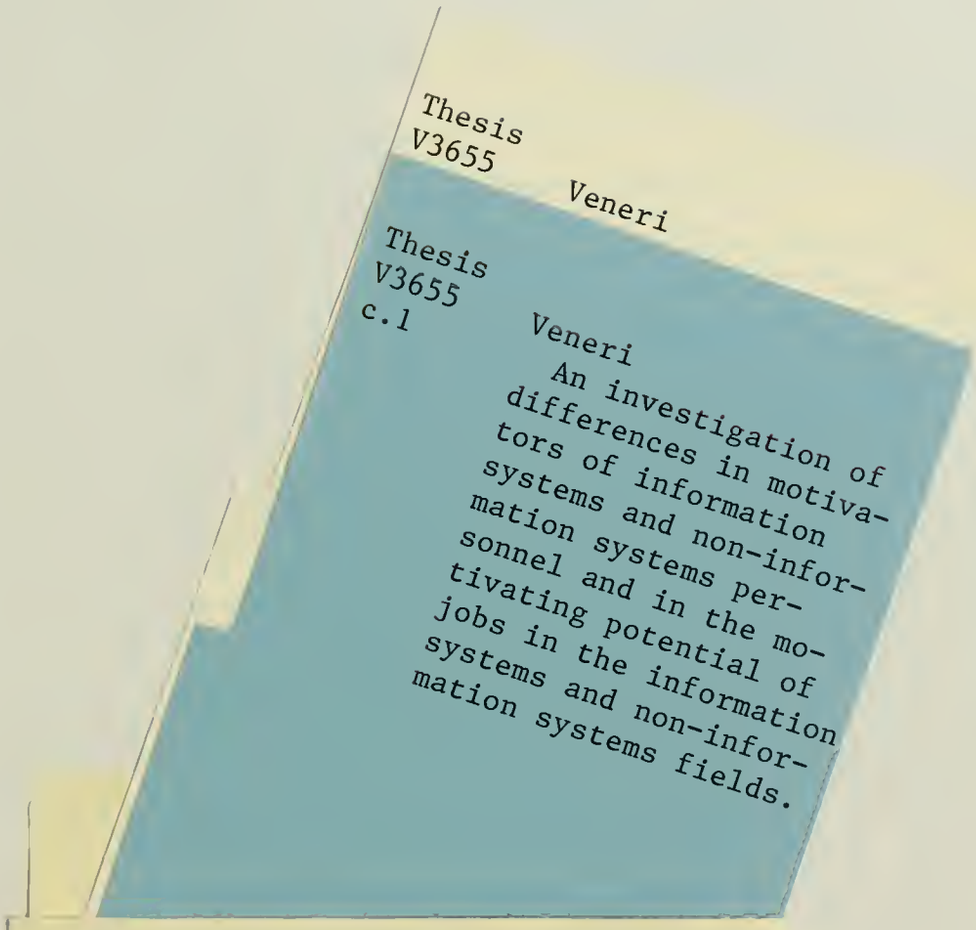
11. Yaverbaum, G.J., "Critical Factors in the User Environment: An Experimental Study of Users, Organizations and Tasks," MIS Quarterly, Vol. 12, No. 1, March 1988.

12. Stone, E.F., Research Methods in Organizational Behavior, Goodyear Publishing Company, Inc., 1978.

13. Goldstein, D.K., and Rockart, J.F., "An Examination of Work-Related Correlates of Job Satisfaction in Programmer/Analysts," MIS Quarterly, Vol. 8, No. 2, June 1984.

## INITIAL DISTRIBUTION LIST

| | | No. Copies |
|---|---|---|
| 1. | Defense Technical Information Center<br>Cameron Station<br>Alexandria, Virginia 22304-6145 | 2 |
| 2. | Library, Code 0142<br>Naval Postgraduate School<br>Monterey, California 93943-5002 | 2 |
| 3. | Computer Technology Curricular Office,<br>Code 37<br>Naval Postgraduate School<br>Monterey, California 93943-5000 | 1 |
| 4. | Professor Taracad R. Sivasankaran<br>Department of Accounting and Management<br>Information Systems<br>ST622<br>California State University<br>18111 Nordhoff Street<br>Northridge, California 91330 (B.A.&E.) | 10 |
| 5. | Professor Benjamin J. Roberts, Code 54Ro<br>Department of Administrative Sciences<br>Naval Postgraduate School<br>Monterey, California 93943-5000 | 1 |
| 6. | LT Janice M. Veneri<br>1193 Bucknell Drive<br>Monroeville, Pennsylvania 15146 | 2 |




Thesis
V3655
c.1

Veneri
An investigation of differences in motivators of information systems and non-information systems personnel and in the motivating potential of jobs in the information systems and non-information systems fields.